Before the
FEDERAL COMMUNICATIONS COMMISSION
Washington, DC 20554

In the Matter of	)	
	)	
TerreStar Corporation Request	)	WT Docket No. 16-290
For Temporary Waiver of	)	
Substantial Service Requirements	)	

SUPPLEMENTAL COMMENTS OF TERRESTAR CORPORATION

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Table of Contents

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I. Introduction and Summary

TerreStar Corporation ("TerreStar") hereby urges the Wireless Telecommunications Bureau ("Bureau") to grant its request for a temporary, thirty-six month waiver of its substantial service requirements.[1] No party opposes TerreStar's Waiver Request and it has been pending for almost ten months. Grant of TerreStar's request meets the Commission's criteria for temporary waiver[2] and will yield important benefits for millions of patients in

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[1] *See* ULS File Nos. 0007375830 through 0007375893, filed by TerreStar on August 12, 2016, and exhibit attached thereto, *TerreStar Corporation Request for Temporary Waiver of Substantial Service Requirements* ("Waiver Request"); *see also* Public Notice, *Wireless Telecommunications Bureau Seeks Comment Regarding TerreStar Corporation's Request for Relief of Certain 1.4 GHz Construction Requirements*, WT Docket No. 16-290, 31 FCC Rcd 9798 (rel. Sep. 14, 2016) (DA 16-1029).

[2] As the Bureau recently pointed out in granting a temporary construction waiver to another mobile wireless licensee, "Section 1.925(b)(3) of the rules provides that we 'may grant a request for waiver if it is shown that … (i) [t]he underlying purpose of the rule(s) would not be served or would be frustrated by application to the instant case, and that a grant of the requested waiver would be in the public interest; or (ii) [i]n view of unique or unusual factual circumstances of the instant case, application of the rule(s) would be inequitable, unduly burdensome or contrary to the public interest, or the applicant has no reasonable alternative.'" *Maritime Communications/Land Mobile, LLC, Debtor-in-Possession*, FCC File Nos. 0007603776-79; FCC File No. 0005552500, Order, DA 17-450, ¶ 15 (WTB rel. May 11, 2017)

hospitals and other health care facilities across the nation. Because TerreStar's spectrum is adjacent to frequencies already dedicated to wireless medical telemetry, grant of the Waiver Request will seamlessly expand medical telemetry capacity at 1.4 GHz nationwide by approximately 67%. This increased capacity will permit TerreStar and equipment manufacturers to implement new, innovative telemetry applications, and will help avoid spectrum congestion that will otherwise result as the U.S. patient population ages and the need for remote monitoring at hospitals becomes more intense. By taking this action, the Bureau will enhance the reliability of life-critical medical telemetry transmissions and further the Commission's important health care goals.

TerreStar's decision to deploy wireless medical telemetry in the commercial 1.4 GHz band is the result of its multi-year effort to identify the best and safest use of its 1.4 GHz licenses. Since gaining control of this spectrum in March 2013, TerreStar has worked diligently to develop robust wireless operations in this band, while accounting for the existence of highly sensitive, life-critical Wireless Medical Telemetry Service ("WMTS") systems in adjacent spectrum. After years of exploring wireless applications that could coexist with and protect WMTS, TerreStar determined that expansion of this important safety-of-life service will yield greater public interest benefits than any other currently feasible use of the 1.4 GHz band.

(granting waiver allowing additional time to demonstrate substantial service); 47 C.F.R. §§ 1.925(b)(3).

II. TerreStar Satisfies the Commission's Criteria for a Temporary Waiver of Its Substantial Service Requirements

In its August 12, 2016 Waiver Request,[3] TerreStar described its commercial 1.4 GHz holdings[4] and provided background on the dedicated WMTS spectrum at 1.4 GHz.[5]

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[3] TerreStar met with Bureau staff during late 2015 and early 2016 to discuss its plan to file a request for temporary waiver of its substantial service requirements at 1.4 GHz. TerreStar initially submitted this request on July 25, 2016. Following discussions with Bureau staff, TerreStar re-filed this request on August 12, 2016, with a revised spectrum leasing framework for wireless medical telemetry operations in its licensed spectrum.

[4] *See* Waiver Request at 3. TerreStar is the sole, nationwide licensee in the commercial wireless 1.4 GHz band at 1390-1395 MHz and 1432-1435 MHz, immediately adjacent to the dedicated WMTS bands at 1.4 GHz. TerreStar's sixty-four geographic area licenses include six Economic Area Grouping ("EAG") licenses in the 1.4 GHz A Block (1392-1393.5 MHz/1432-1433.5 MHz), six EAG licenses in the 1.4 GHz B Block (1393.5-1395 MHz/1433.5-1435 MHz), and fifty-two Major Economic Area ("MEA") licenses in the unpaired 1390-1392 MHz band.

[5] *See* Waiver Request at 8-12. The development of wireless medical telemetry over the past thirty years has generated important medical benefits, substantially improving health care providers' standard of care and the quality of patients' experiences and outcomes. Hospitals and other health care providers can now monitor, remotely and in real-time, their patients' vital signs such as heart and respiration rates, oxygen saturation, and other important health parameters. With wireless medical telemetry, nurses at a nurses' station can detect promptly potentially life-threatening conditions (*e.g.*, cardiac arrhythmias and apneas), and respond more rapidly to changes in their patients' conditions. In addition, the untethered nature of wireless medical telemetry provides patients with greater mobility, freedom, comfort, and safety, including by lowering the risk of patient falls due to tripping hazards attributed to wired equipment. Health care providers are using wireless medical telemetry equipment in an expanding variety of health care settings, including in formerly "non-monitored" areas such as surgical facilities and general wards.

To facilitate the development of wireless medical telemetry, the Commission established the dedicated 1.4 GHz WMTS band, consisting of a five megahertz band segment at 1395-1400 MHz and a varying two and a half megahertz band segment within the 1427-1431.5 MHz band. These bands are immediately adjacent to TerreStar's licensed 1.4 GHz spectrum. *See Amendment of Parts 2 and 95 of the Commission's Rules to Create a Wireless Medical Telemetry Service*, Report and Order, 15 FCC Rcd 11206 (2000); *Amendments to Parts 1, 2, 27 and 90 of the Commission's Rules to License Services in the 216-220 MHz, 1390-1395 MHz, 1427-1429 MHz, 1429-1432 MHz, 1432-1435 MHz, 1670-1675 MHz, and 2385-2390 MHz Government Transfer Bands*, Report and Order, 17 FCC Rcd 9980 (2002) ("*1.4 GHz Service Rules Order*").

TerreStar explained at length how a grant of the Waiver Request will further the public interest, generating enormous benefits for millions of patients in hospitals and other health care facilities around the United States.[6] TerreStar described why it needs additional time under its license to implement wireless medical telemetry operations in its spectrum, and asked that Bureau temporarily waive its substantial service requirement in the commercial 1.4 GHz band until April 23, 2020.[7]

TerreStar's Waiver Request has received strong support from equipment manufacturers Philips Healthcare and GE Healthcare and the American Society for Healthcare Engineering ("ASHE") of the American Hospital Association, the largest association devoted to professionals who design, build, maintain, and operate hospitals and other health care facilities.[8] TerreStar greatly appreciates the support of these parties, who have deep expertise on the medical telemetry ecosystems in the dedicated WMTS bands.

Since submitting the Waiver Request, TerreStar has filed applications for renewal of its sixty-four wireless licenses in the commercial 1.4 GHz band, subject to the terms of any

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6 Waiver Request at 20-22.

7 *Id*. at 1, 26-30. Under Section 27.14(a) of the Commission's rules, TerreStar was required to demonstrate that it provided substantial service in each of its license areas by April 23, 2017. Under this rule, a commercial wireless licensee at 1.4 GHz must demonstrate that it is providing "service which is sound, favorable and substantially above a level of mediocre service which just might minimally warrant renewal," in order to show that it is providing substantial service. 47 C.F.R. § 27.14(a). The Commission has not adopted any substantial service "safe harbor" for 1.4 GHz band licensees, in contrast to its approach in the upper microwave bands and other commercial spectrum. *See 1.4 GHz Service Rules Order* ¶ 73.

8 *See* WT Docket No. 16-290, Comments of GE Healthcare (Oct. 4, 2016); Letter from Delroy Smith, Philips Healthcare, to Marlene H. Dortch, FCC (Oct. 4, 2016); Reply Comments of Philips Healthcare (Oct. 14, 2016); Letter from Lawrence Movshin, Counsel to ASHE, to Amanda Huetinck, FCC (Nov. 10, 2016).

waiver grant.[9] TerreStar demonstrated that it satisfies the Commission's renewal criteria for its wireless licenses, and, like the Waiver Request, the renewal applications are unopposed. Most recently, on May 24, 2017, TerreStar filed comments in response to the Commission's Public Notice on actions to accelerate adoption and accessibility of broadband-enabled health care solutions and advanced technologies.[10] In its comments, TerreStar commended the Commission for its efforts to promote health care quality and innovation through the use of communications technology, and pointed out that TerreStar's proposed use of its commercial 1.4 GHz spectrum for wireless medical telemetry operations will advance the goals set forth in the *Health Care PN*. ASHE and GE Healthcare also filed comments on the *Health Care PN* noting the threat of WMTS spectrum congestion and reiterating their support for TerreStar's proposed wireless medical telemetry operations at 1.4 GHz.[11]

In these supplemental comments, TerreStar highlights the enormous public interest benefits that will result if it is provided sufficient time and regulatory certainty to implement wireless medical telemetry in its licensed 1.4 GHz spectrum. As explained below, TerreStar's expansion of wireless medical telemetry at 1.4 GHz will be seamless for the

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9 *See* ULS File Nos. 0007746734 through 0007746797 and attached Exhibit 1, *Exhibit to Application for Renewal of Licenses of TerreStar 1.4 Holdings LLC*, filed April 21, 2017 ("License Renewal Exhibit").

10 Public Notice, *FCC Seeks Comment and Data on Actions to Accelerate Adoption and Accessibility of Broadband-Enabled Health Care Solutions and Advanced Technologies*, GN Docket No. 16-46, FCC 17-46 (rel. Apr. 24, 2017) ("*Health Care PN*"); Comments of TerreStar Corporation, GN Docket No. 16-46 (May 24, 2017) ("TerreStar Comments"). In the *Health Care PN,* the Commission asked for comment on, among other things, issues related to wireless medical telemetry operations at health care facilities. The Commission noted the Waiver Request and TerreStar's proposal to use its 1.4 GHz spectrum for wireless medical telemetry operations. *Health Care PN* at 13-14.

11 Comments of the American Society for Healthcare Engineering of the American Hospital Association, GN Docket No. 16-46, at 12-13 (May 24, 2017); Comments of GE Healthcare, GN Docket No. 16-46, at 6-7 (May 24, 2017).

hospitals, health care facilities, and millions of patients that benefit from these operations. The Bureau should expeditiously grant the Waiver Request with appropriate terms and conditions.

A. Grant of TerreStar's Waiver Request Will Generate Enormous Health Care Benefits

Grant of the Waiver Request will enable TerreStar to use its licensed spectrum at 1.4 GHz for wireless medical telemetry applications in hospitals and other health care facilities and environments nationwide. This expansion of spectrum resources for wireless medical telemetry will deliver substantial public interest benefits by improving the quality of medical care for millions of patients throughout the country.[12]

As TerreStar has described in this proceeding, the development of wireless medical telemetry has yielded enormous health care benefits. The reliability of these life-critical transmissions could be jeopardized in the coming years, however, by a shortage of spectrum for this service. Demand for remote patient monitoring in American hospitals and other health care facilities will likely continue to increase significantly over the next decade as the U.S.

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[12] Chairman Ajit Pai has made clear his commitment to spectrum-related actions that "enable[e] significant, positive impacts on Americans' health and on overall health care costs." *Amendment of the Commission's Rules to Provide Spectrum for the Operation of Medical Body Area Networks*, First Report and Order and Notice of Proposed Rulemaking, 27 FCC Rcd 6422, 6488 (2012) (Statement of Commissioner V. Ajit Pai). Commissioner Mignon Clyburn has also emphasized the health care benefits of communications technology. *See* Keynote Remarks of Commissioner Mignon Clyburn, Cleveland Clinic's 2015 Medical Innovation Summit (Oct. 26, 2015) ("[T]he real power of connectivity is what it enables in health. . . . [T]his is also about the individual, the consumer, the patient, *not* just the connections, the devices or the apps. It is about how technology is meeting the needs and improving the lives of people.") (emphasis in original), https://www.fcc.gov/document/commissioner-clyburn-keynote-remarks-2015-medical-innovation-summit.

patient population ages and experiences frequent and acute medical problems.[13] Health care providers will respond by deploying additional wireless medical telemetry devices within their facilities, potentially resulting in spectrum congestion and disrupted transmissions. This interference threat is already real and will be exacerbated by growing fears related to the operation of devices in unlicensed 600 MHz spectrum (where there is dedicated WMTS spectrum) and in the crowded 2.4 GHz ISM band; these concerns are likely to spur the migration of additional wireless medical telemetry to the 1.4 GHz band. Unfortunately, no other source of additional, dedicated wireless medical telemetry spectrum has been identified to alleviate this spectrum shortage and address the growing threat of interference to WMTS.[14]

In the face of this increasing pressure on existing WMTS allocations, grant of the Waiver Request is a ready pathway to ensuring the reliability and security of wireless medical telemetry operations. It is likely the last, best chance to add much-needed capacity for these life-critical systems. This action will enable TerreStar to make available five additional megahertz of spectrum for wireless medical telemetry on a nationwide basis in hospitals and other health care facilities, an approximately 67% increase in capacity at 1.4 GHz. With this expanded capacity, hospitals and health care providers will avoid spectrum

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[13] In addition, the types of biometric data transmitted over wireless medical telemetry systems will expand with advances in medical technology, adding significantly more bandwidth demand per patient.

[14] Chairman Pai has pointed out that in health care environments "[h]armful interference could have serious and immediate consequences," since "WMTS can involve matters of life and death." *Amendment of Part 15 of the Commission's Rules for Unlicensed Operations in the Television Bands, Repurposed 600 MHz Band, 600 MHz Guard Bands and Duplex Gap, and Channel 37, et al*., Report and Order, 30 FCC Rcd 9551, 9733-34 (Statement of Commissioner Ajit Pai) (2015). Commissioner Michael O'Rielly has stated that he appreciates Chairman Pai's efforts "to ensure that hospitals that rely on this spectrum for such devices as heart and fetal monitors, something I have learned more about lately, can avoid harmful interference." *Id*. at 9736 (Statement of Commissioner Michael O'Rielly).

exhaustion and congestion while deploying telemetry devices more densely and utilizing new and innovative applications. The Commission should seize this unique opportunity to enhance the quality of medical care for millions of patients at hospitals and other health care facilities throughout the country.

The developmental use of TerreStar's licensed spectrum for medical telemetry applications *outside* health care facilities will also yield substantial public interest benefits. While the Commission's technical rules preclude the use of TerreStar's licensed spectrum at 1392-1395 MHz at hospitals and other health care facilities in order to protect WMTS systems above 1395 MHz from interference,[15] with the Bureau's grant, this three megahertz band segment can and will be used for developmental and specialized medical telemetry operations outside of those facilities.[16] The operation of medical telemetry devices in mobile settings such as ambulances should produce significant improvements in emergency medical care. Medical telemetry in residences, nursing homes, and rehabilitation centers will provide significant benefits to patients, who increasingly rely on medical treatment in residential and other similar environments and require real-time monitoring. In addition, research and development of wireless medical telemetry equipment – potentially as dedicated test sites for WMTS – promises to stimulate innovation and the development of new medical telemetry applications. Currently, there is no dedicated WMTS spectrum available for testing new medical telemetry applications. Significantly, rural telemedicine

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15 *See* 47 C.F.R. §§ 27.53, 27.804.

16 In contrast to TerreStar's proposed wireless medical telemetry operations at 1.4 GHz under Part 27 of the Commission's rules, existing WMTS systems under Part 95 of the Commission's rules can only be operated within hospitals and other health care facilities. S*ee* 47 C.F.R. §§ 95.1107.

applications could benefit patients in rural and remote areas with the greatest need for improved medical care and treatment.

TerreStar is working cooperatively with equipment manufacturers, frequency coordinators, and health care industry representatives to ensure a robust implementation of wireless medical telemetry in its licensed spectrum. TerreStar is committed to using its spectrum during its license terms to maximize benefits for the health care community and millions of patients across the United States. These future public interest benefits strongly support a grant of TerreStar's Waiver Request.

B. Wireless Medical Telemetry Operations in TerreStar's Licensed Spectrum Will Be Largely Seamless for Hospitals, Health Care Providers, and Patients

TerreStar's use of its licensed spectrum for wireless medical telemetry will deliver great public interest benefits without causing any disruption to the health care ecosystem. Following a grant of the Waiver Request (and renewal of its 1.4 GHz licenses), TerreStar's use of its licensed spectrum for wireless medical telemetry will be largely seamless for hospitals, health care providers, and patients. These operations will occur in the commercial 1.4 GHz band under spectrum manager leasing arrangements,[17] with lease terms ensuring long-term wireless medical telemetry use of this spectrum. TerreStar expects that Philips

[17] These spectrum manager lease arrangements will be consistent with the criteria contained in Sections 1.9010 and 1.9020 of the Commission's rules. 47 C.F.R. §§ 1.9010, 1.9020. Under these arrangements, TerreStar would retain both *de jure* and *de facto* control of its licensed 1.4 GHz spectrum, as required under the Commission's secondary markets rules and orders. TerreStar would be fully responsible for ensuring spectrum lessees' compliance with the Communications Act and all applicable policies and rules directly related to the use of its 1.4 GHz spectrum. Through lease provisions and actual oversight and enforcement of such provisions, TerreStar would ensure that these spectrum lessees operate in conformance with applicable technical and operational rules for the 1.4 GHz band.

Healthcare, GE Healthcare, and other equipment manufacturers and vendors will in most instances be the spectrum manager lessees in these arrangements.[18] This role is appropriate for medical telemetry equipment manufacturers, since it is the manufacturer that typically oversees the engineering, installation, and maintenance of wireless medical telemetry systems deployed at health care facilities. While hospitals and health care facilities will be free to enter into individual spectrum manager lease arrangements directly with TerreStar, they will not *have* to do so to use medical telemetry systems operating in the commercial 1.4 GHz band.[19]

TerreStar's spectrum manager leasing arrangements with equipment manufacturers and other entities will also be non-exclusive. TerreStar expects to enter into multiple spectrum manager leases covering the same frequencies and geographic areas, with the multiple lessees in those areas sharing that spectrum. As a result of this open leasing approach, TerreStar's spectrum manager lease arrangements with equipment manufacturers and vendors should collectively cover the populated geography of the United States, and generally extend for the useful life of the installed wireless medical telemetry equipment. Accordingly, health care facilities *everywhere* should be able to contract with vendors for

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[18] TerreStar's spectrum manager lease arrangements will ensure that parties that invest in systems and devices and initiate wireless medical telemetry on TerreStar's licensed 1.4 GHz spectrum will be protected for the reasonable life of their equipment investment from any incompatible use of this spectrum.

[19] TerreStar commits that it will enter into a spectrum manager leasing arrangement in the commercial 1.4 GHz band with any equipment manufacturer or other qualified health care entity that (i) meets the Commission's eligibility and qualification requirements, (ii) consents to certain basic conditions regarding wireless medical telemetry use, and (iii) otherwise agrees to reasonable terms and conditions for such lease arrangements.

the installation and secure, reliable use of wireless medical telemetry systems at 1.4 GHz, just as they do today in the dedicated WMTS bands.

Finally, as the licensee in this band, TerreStar will implement a national registration and frequency coordination framework similar to the procedures in place today in the dedicated WMTS bands. TerreStar hopes to contract with ASHE and Comsearch to establish and administer this wireless medical telemetry database and registration system in its commercial 1.4 GHz spectrum. Similar to the existing, dedicated WMTS spectrum at 1.4 GHz, health care providers and other spectrum lessees intending to operate wireless medical telemetry equipment in TerreStar's spectrum will be required to register their equipment in TerreStar's commercial 1.4 GHz database.[20] TerreStar's database will provide spectrum manager lessees and other parties with the information necessary to coordinate and avoid interference between different wireless medical telemetry systems at 1.4 GHz. With respect to cost, beyond potential equipment expenses, health care entities will pay at most the registration and coordination fees associated with TerreStar's 1.4 GHz database. These fees will be determined by market forces and are likely to mirror the fees ASHE currently collects for registration and coordination in the dedicated WMTS bands.

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[20] *See* Waiver Request at 19. Parties using wireless medical telemetry equipment within health care facilities (*i.e.*, devices operating in TerreStar's spectrum at 1390-1392 MHz/1432-1435 MHz) will indicate the location of those facilities, and provide such information as manufacturer, model number, operating frequency, emission type, and other relevant technical parameters. Wireless medical telemetry operators using equipment outside health care facilities (including devices operating at 1392-1395 MHz) would specify the location and nature of the operating environment, as well as provide appropriate technical information. As described above, the use of TerreStar's commercial 1.4 GHz spectrum will enable wireless medical telemetry systems to expand into mobile operation, home usage, nursing facilities, and other locations where there is a growing need for such wireless medical functionality but Part 95 WMTS is not permitted.

C. TerreStar Can Implement Wireless Medical Telemetry on Its Licensed Spectrum Only if Provided the Necessary Time and Regulatory Certainty

Earlier this year, TerreStar's representatives engaged in discussions with Bureau staff regarding potential waiver conditions, including milestones relating to the modification, testing, certification, and deployment of wireless medical telemetry equipment and devices operating at 1.4 GHz.[21] Ultimately, any waiver conditions adopted by the Bureau must account for the fact that wireless medical telemetry operations in TerreStar's licensed 1.4 GHz spectrum – and the resulting public interest benefits – are possible only if TerreStar and future partners have sufficient time and regulatory certainty to deploy these systems.

As explained in the Waiver Request and in its license renewal applications, TerreStar's robust national deployment of wireless medical telemetry at 1.4 GHz involves several complex developmental phases that, while overlapping, will likely take three years or more to complete industry-wide. In the first of these phases, existing WMTS equipment and devices in the advanced production stage will be modified through a firmware update to permit operations on TerreStar's spectrum at 1390-1395 MHz or 1432-1435 MHz. In the Waiver Request, TerreStar stated its expectation that, industry-wide, this frequency conversion phase will last six to twelve months and would be largely completed by August 2017.[22] In a second developmental phase, TerreStar and equipment manufacturers will initiate safety and efficacy testing for wireless medical telemetry devices operating in

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[21] *See* Letter from Regina M. Keeney, Counsel to TerreStar Corporation, to Marlene H. Dortch, FCC Secretary, WT Docket No. 16-290 (Apr. 4, 2017).

[22] Waiver Request at 27-28.

TerreStar's 1.4 GHz spectrum. This implementation stage will involve the development of prototype devices and trial deployments in laboratories and other test facilities. TerreStar indicated in its Waiver Request that this safety and quality testing phase will last approximately twelve to eighteen months and would be largely completed by December 2017.[23]

On the regulatory side, TerreStar and equipment manufacturers will have to complete the necessary equipment certification process before modified WMTS equipment can operate in the field on TerreStar's licensed 1.4 GHz spectrum. This re-certification phase will include laboratory compliance testing and waiting periods for Telecommunications Certification Body approval. TerreStar estimated that it would take twelve to eighteen months to complete re-certification for a critical mass of wireless medical telemetry devices at 1.4 GHz and expressed hope that this process would be largely completed by June 2018.[24]

In the Waiver Request, TerreStar further stated that the installation of wireless medical telemetry systems at 1.4 GHz will likely begin in large health care facilities with the most extensive wireless patient monitoring during 2018, and that by January 2020 there will be operational deployments at a significant number of health care facilities with existing WMTS systems.[25] TerreStar at that time anticipated that, by April 2020, there will likely be a robust deployment of wireless medical telemetry equipment in each of TerreStar's license areas, with its newly deployed medical telemetry footprint rivaling the geographic reach of existing

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23 *Id*. at 28.

24 *Id*. at 28-29.

25 *Id*. at 29.

WMTS operations at 1.4 GHz.[26] TerreStar believes that these wireless medical telemetry operations will satisfy the Commission's substantial service requirement for each of its commercial 1.4 GHz licenses.

Accordingly, TerreStar urges the Bureau to grant the Waiver Request with appropriate terms and conditions – including a suitable deployment timetable – that will enable TerreStar to bring enormous health care benefits to millions of patients treated at hospitals and other health care facilities around the country.

III. TerreStar's Current Ownership Has Diligently Pursued the Development of Its Commercial 1.4 GHz Licenses Since Gaining Control of This Spectrum in 2013

In March 2013, TerreStar emerged from an extended bankruptcy proceeding with new management and controlling interests that remain in control of its 1.4 GHz licenses today.[27] Since gaining control of this spectrum, TerreStar's current owners have diligently

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[26] In some cases, existing WMTS equipment at health care facilities will be upgraded to operate at 1390-1392 MHz and 1432-1435 MHz, while at other facilities the existing WMTS infrastructure might be supplemented with new wireless medical telemetry equipment capable of operating on these TerreStar frequencies.

[27] *See* TerreStar Corporation, FCC Form 602 (Ownership Disclosure Report), File No. 0007746723 (April 21, 2017). Following its acquisition of sixty-four licenses in the commercial 1.4 GHz band in 2008-2009, TerreStar intended to develop an innovative, wireless communications system to provide mobile coverage throughout North America using integrated satellite-terrestrial smartphones and other devices. Darren Murphy, *TerreStar Genus: AT&T's First Dual-Mode Cellular/Satellite Smartphone*, ENGADGET (Sep. 30, 2009), https://www.engadget.com/2009/09/30/terrestar-genus-atandts-first-dual-mode-cellular-satellite-sma/ (describing availability of TerreStar's dual-mode satellite-terrestrial smartphone). While TerreStar did roll out a hybrid satellite-terrestrial service in 2009, it encountered financial difficulty and filed an initial voluntary petition for Chapter 11 bankruptcy on October 19, 2010. When TerreStar sold its 2 GHz MSS spectrum to DISH Network in June 2011 as part of its financial restructuring, it retained its terrestrial wireless spectrum in the 1.4 GHz band. *See* Notice of the Occurrence of the Effective Date Under the Joint Chapter 11 Plan of Terrestar Corporation, http://www.terrestarcorprestructuring.com/pdflib/734_10612.pdf.

pursued the development of these licenses. The Commission should weigh these efforts in favor of a grant of the Waiver Request.

Following the bankruptcy proceeding, TerreStar's new owners in early 2013 began executing plans for the widespread deployment of a high-power 802.16 WiMAX network for use in smart-grid applications. At that time, demand for licensed smart-grid services was forecast to grow rapidly throughout the United States, with utilities seeking to use 4G wireless technology to optimize operational efficiency, enable consumer participation, and enhance overall reliability, security, and quality of their services.[28] Significantly, manufacturers and other vendors had already developed a WiMAX device and infrastructure ecosystem for utilities' smart-grid operations in the commercial 1.4 GHz band.[29] Based on industry demand and the existence of this ecosystem, TerreStar believed in early 2014 that it could meet its substantial service requirements at 1.4 GHz through a robust national deployment of smart-grid WiMAX facilities.

The market potential of a smart-grid WiMAX network was demonstrated at that time by TerreStar's earlier May 2012 spectrum lease arrangement with FirstEnergy Service Company ("FirstEnergy"), a large electrical utility.[30] This lease agreement permitted FirstEnergy to deploy high-power 802.16 WiMAX facilities for smart grid applications in two EAG license areas in the 1.4 GHz A and B Blocks. FirstEnergy's Smart Grid

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[28] *See* The Smart Grid Market 2012-2022, VISIONGAIN, https://www.marketresearch.com/product/sample-6917022.pdf (providing smart grid market forecast as of 2012).

[29] *See Airspan Networks for Smart Utility Communication in 1.4 GHz: Smart Utility Communication in 1.4 GHz*, AIRSPAN, http://www.distrodoc.com/371301-airspansmartgrids1400brochure-2.

[30] TerreStar entered into the lease arrangement with FirstEnergy in May 2012, prior to the conclusion of the company's bankruptcy proceeding and the emergence of new controlling interests.

Modernization Initiative project included deployment of advanced metering infrastructure, distribution automation assets, time-based rate programs, load control, and customer systems in New Jersey, Ohio, and Pennsylvania.[31] TerreStar's 1.4 GHz spectrum was a critical part of the communications infrastructure for this project, enabling data to be wirelessly transmitted between smart grid systems and pole-mounted concentrators.

As part of its WiMAX implementation efforts, TerreStar reached out to incumbents in adjacent spectrum bands in February 2014 to identify any potential technical issues related to its planned smart-grid deployments. TerreStar's technical consultant, Jarvinian Advisors ("Jarvinian"), began discussions with representatives from the WMTS industry, including engineers from equipment vendors Philips Healthcare and GE Healthcare and officials from ASHE. These WMTS representatives all expressed concern that high-power, smart-grid WiMAX operations in the commercial 1.4 GHz band would cause significant harmful interference to medical telemetry systems operating in adjacent WMTS spectrum at 1395-1400 MHz and 1427-1431.5 MHz. In response, TerreStar instructed Jarvinian to evaluate the risk of interference to WMTS. Jarvinian's laboratory and field tests during the first half of 2014 confirmed that, even if compliant with the Commission's rules, smart-grid WiMAX operations in TerreStar's licensed spectrum would likely have a significant, deleterious impact on life-critical WMTS devices and systems at health care facilities across the United States.[32]

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[31] An overview of FirstEnergy's Smart Grid Modernization Initiative Project can be found at https://www.smartgrid.gov/files/Fact_Sheet_FirstEnergy_Smart_Grid_Modernization_Initiative_201103.pdf.

[32] As Jarvinian found in its tests, the vulnerability of WMTS to harmful interference stems from the low-power nature of those devices. To extend battery life and to ensure that

Thus, by mid-2014, TerreStar was aware that a robust WiMAX network at 1.4 GHz would likely compromise patient safety at the nearly two thousand registered health care facilities that currently use dedicated 1.4 GHz WMTS spectrum for life-critical patient monitoring, even if the network complied with all Commission rules. During that period, TerreStar worked closely with WMTS interests to identify any potential technical solutions to this interference problem. This effort was unsuccessful, however. Jarvinian and WMTS representatives discussed the possibility of adding filtration to WMTS devices, but this option was not logistically or economically feasible and would likely result in impaired WMTS functionality.[33] The parties also rejected commercial wireless exclusion zones around registered WMTS facilities, since such operational constraints in and around approximately 3,800 health care locations would undercut the economic viability of any commercial service in TerreStar's spectrum.[34] Unfortunately, following their substantial and cooperative technical efforts, Jarvinian and the WMTS vendors collectively concluded that an 802.16 WiMAX system was fundamentally incompatible with adjacent-band, real-world WMTS receivers.

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patients can comfortably wear WMTS monitoring devices as they move around health care facilities, medical telemetry devices are designed to transmit at extremely low power levels. To function effectively at such power levels, WMTS receivers must be highly sensitive and utilize wide passband filters that offer little protection from adjacent-band operations. As a result, even fully compliant 802.16 WiMAX systems would create enough emissions in WMTS passbands to interfere with real-time patient telemetry. This problem is particularly acute in the case of mobile WiMAX device operations, where the emission source can be physically close to the WMTS receiver.

[33] Under this filtration approach, a high-selectivity filter would have to be developed and deployed at tens of thousands of 1.4 GHz WMTS receiver nodes. Beyond the unavoidable logistical difficulties of this approach, such filtration would not address interference to WMTS receivers caused by in-band transmissions.

[34] In addition, exclusion zones would not guarantee interference protection from the operation of transient mobile terminals in the commercial 1.4 GHz band.

In its continuing effort to develop its licensed spectrum while safeguarding WMTS, TerreStar by mid-2014 focused on downlink-only operations as an alternative deployment approach at 1.4 GHz. While the operation of commercial mobile devices in this band would likely threaten harmful interference to WMTS, downlink-only, base station operations in this spectrum could coexist with adjacent-band WMTS. Such a downlink-only restriction would preclude the deployment of a standalone WiMAX or LTE network at 1.4 GHz, but TerreStar recognized that downlink-only spectrum at 1.4 GHz could potentially be paired with uplink spectrum elsewhere to form a new, paired frequency band for FDD LTE operations. With this understanding, TerreStar decided in July 2014 to invest in a wireless start-up venture, 2014 AWS Spectrum Bidco Corporation ("AWS Bidco"), that planned to participate in the auction of AWS-3 spectrum at 1.7 GHz.[35] If AWS Bidco were successful in establishing a national footprint in the 1.7 GHz band, TerreStar would seek to negotiate with AWS Bidco for access to uplink spectrum that could be paired with its own commercial 1.4 GHz licenses.[36]

In Auction 97, which concluded in January 2015, AWS Bidco was the provisional winning bidder for eighteen geographic area licenses in the AWS-3 B1 block at 1695-1710 MHz, but failed to secure enough licenses to have a meaningful nationwide footprint in this

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[35] *See* Public Notice, *Auction of Advanced Wireless Services (AWS-3) Licenses Scheduled for November 13, 2014; Notice and Filing Requirements, Reserve Prices, Minimum Opening Bids, Upfront Payments, and Other Procedures for Auction 97*, 29 FCC Rcd 8386 (2014).

[36] On June 3, 2014, TerreStar's representatives met with Commission staff and made a presentation regarding the potential pairing of TerreStar's 1.4 GHz licenses with AWS-3 spectrum.

band.[37] This outcome eliminated any chance that TerreStar's licensed 1.4 GHz spectrum could be designated for base station operations by pairing it with mobile transmit spectrum at 1.7 GHz. With standalone WiMAX or LTE operations in the commercial 1.4 GHz band effectively ruled out due to WMTS interference concerns, TerreStar reassessed its deployment options at 1.4 GHz during the course of 2015.

After additional internal analysis and discussions with WMTS interests, TerreStar in September 2015 determined to move forward with its plan for wireless medical telemetry use of its licensed 1.4 GHz spectrum. In making this decision, TerreStar recognized not only the urgent need for additional WMTS capacity, but also the fact that the enormous installed base of WMTS equipment could be converted for operations in the commercial 1.4 GHz band. As designed and manufactured, many WMTS devices have front-end passband filters sufficiently wide that, with the appropriate firmware modification, this equipment can operate on spectrum adjacent to the dedicated WMTS spectrum at 1395-1400 MHz and between 1427-1431.5 MHz. As discussed *infra* at 13, once TerreStar and manufacturers complete the required equipment re-certification process, these devices will be able to operate on TerreStar's licensed bands at 1390-1395 MHz and 1432-1435 MHz.[38] Based on

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[37] *See* Public Notice, *Auction of Advanced Wireless Services (AWS-3) Licenses Closes; Winning Bidders Announced for Auction 97*, 30 FCC Rcd 630 (2015); Public Notice, *Wireless Telecommunications Bureau Grants AWS-3 Licenses in the 1695-1710 MHz Band*, 31 FCC Rcd 12745 (2016); *see also* Application of 2014 AWS Spectrum Bidco Corporation, ULS File No. 0006670619.

[38] As indicated *infra* at 12-13, TerreStar estimates that it will take twelve to eighteen months to complete equipment re-certification for the critical mass of WMTS devices required for a comprehensive, national wireless medical telemetry roll-out in the commercial 1.4 GHz band. *See also* Waiver Request at 28-29. Moreover, while no rule changes are necessary for these operations, TerreStar of course cannot implement wireless medical

the efficiency of this potential deployment and the rapidly growing demand for patient monitoring, TerreStar concluded that wireless medical telemetry operations at 1.4 GHz band will generate public interest benefits far greater than those from any other presently feasible use of this band.

During the fall of 2015 and early 2016, TerreStar continued to meet with WMTS representatives to further develop and refine its plans for wireless medical telemetry use of its spectrum. TerreStar met with Commission staff during this period to discuss these plans. In April 2016, TerreStar informed WMTS interests that it had decided definitively to abandon efforts at 802.16 WiMAX smart-grid development, and that it would seek authority to use its licensed spectrum for medical telemetry applications. TerreStar submitted the Waiver Request in July 2016 and subsequently re-filed this request in August 2016 following discussions with Bureau staff regarding the proposed spectrum leasing framework for this service. The Bureau should grant the Waiver Request and generate important health care benefits for millions of patients in hospitals and other health care facilities across the United States.

IV. Conclusion

For the reasons described in this supplemental filing, TerreStar urges the Bureau to grant the Waiver Request. The Waiver Request meets the criteria for a temporary waiver, and a grant will enable TerreStar to move forward expeditiously and aggressively with its proposed national implementation of wireless medical telemetry operations in the commercial 1.4 GHz band. Grant of the Waiver Request will advance the public interest by

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telemetry in the commercial 1.4 GHz band without grant of a temporary waiver of its substantial service requirements.

protecting and promoting life-critical medical telemetry transmissions and enhancing patient experiences and outcomes at health care facilities throughout the United States.

Respectfully submitted,

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June 7, 2017

Declaration

I declare under penalty of perjury that the facts stated in the foregoing Supplemental Comments of TerreStar Corporation are true and correct to the best of my knowledge.

Executed on June 7, 2017.

/s/ Douglas I. Brandon
Douglas I. Brandon, Secretary
TerreStar Corporation